



Test Report:

6W58925

Applicant:

DAP Technologies
955 Fernand Dufour
Vanier, Quebec, G1M 3B2

Apparatus:

Smart-card Reader 3240-SCR

FCC ID:

T5MA3240SCR

In Accordance With:

FCC Part 15 Subpart C, 15.225
Intentional Radiators

Tested By:

Nemko Canada Inc.
303 River Road
Ottawa, Ontario
K1V 1H2

A handwritten signature in blue ink, appearing to read 'Jason Nixon', with a stylized flourish at the end.

Authorized By:

Jason Nixon, Telecom Specialist

Date:

June 30, 2006

Total Number of Pages:

33

Report Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart C. Radiated tests were conducted in accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

The assessment summary is as follows:

Apparatus Assessed:	Smart-card Reader 3240-SCR
Specification:	FCC Part 15 Subpart C, 15.225
Compliance Status:	Complies
Exclusions:	None
Non-compliances:	None
Report Release History:	Original Release

Author: Roman Kuleba, EMC/Wireless Specialist

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025.

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Section 1 : Equipment Under Test

1.1 Product Identification

The Equipment Under Test was identified as follows: Smart-card Reader 3240-SCR

1.2 Samples Submitted for Assessment

The following samples of the apparatus have been submitted for type assessment:

Sample No.	Description	Serial No.
1	Microflex CE3000 with 3240-SCR Smart-card Reader	00151200MFB4500B

The first samples were received on: January 20th 2006

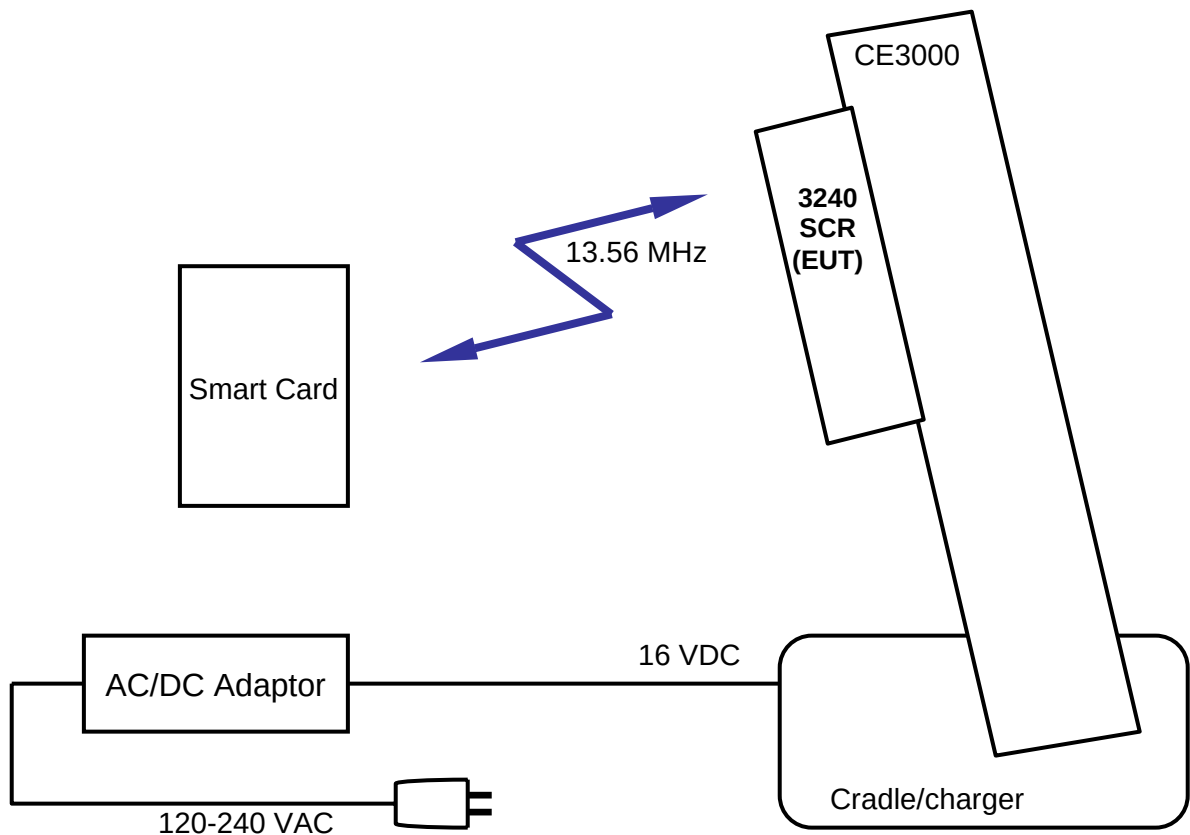
1.3 Theory of Operation

The 3240-SCR is a smart card reader designed for operation at 13.56 MHz.

1.4 Technical Specifications of the EUT

Manufacturer:	DAP Technologies
Transmitter Frequency:	13.56 MHz
Modulation:	ASK, Data Rate: 848 kbps
Antenna Data:	Internal Antenna
Antenna Connector:	N/A
Power Source:	Internal Battery with Charger (cradle)

1.5 Block Diagram of the EUT



Section 2 : Test Conditions

2.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 15 Subpart C, 15.225 (Intentional Radiators)

2.2 Deviations From Laboratory Test Procedures

No deviations were made from laboratory test procedures.

2.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range	:	15 – 30 °C
Humidity range	:	20 - 75 %
Pressure range	:	86 - 106 kPa
Power supply range	:	+/- 5% of rated voltages

2.4 Test Equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Last Cal.	Next Cal.
LISN	EMCO	4825/2	FA001545	March 13/05	March 13/06
Receiver	Rohde & Schwarz	ESHS 10	FA001918	Feb. 28/05	Feb. 28/06
Transient Limiter	Hewlett-Packard	1194 7A	FA000975	May 25/05	May 25/06
Spectrum Analyzer	Hewlett-Packard	8566B	FA001309	May 18/05	May 18/06
Spectrum Analyzer Display	Hewlett-Packard	85662A	FA001309	May 18/05	May 18/06
Bilog Antenna	Schaffner	CBL6112B	FA001504	NCR	NCR
Biconical (2) Antenna	EMCO	3109	FA000904	Aug. 26/05	Aug. 26/06
Log Periodic Antenna #1	EMCO	LPA-25	FA000477	Aug. 29/05	Aug. 29/06
Receiver	Rohde & Schwarz	ESVS-30	FA001437	July 27/05	July 27/06
Horn Antenna #2	EMCO	3115	FA000825	Dec. 16/05	Dec. 16/06
Active Loop Antenna	Rohde & Schwarz	HFH2-Z2	FA000631	May 20/05	May 20/06
Spectrum Analyzer	Rohde & Schwarz	FSP	FA001920	March 22/05	March 22/06

Section 3 : Observations

3.1 Modifications Performed During Assessment

No modifications were performed during assessment.

3.2 Record Of Technical Judgements

No technical judgements were made during the assessment.

3.3 EUT Parameters Affecting Compliance

The user of the apparatus could not alter parameters that would affect compliance.

3.4 Test Deleted

No Tests were deleted from this assessment.

3.5 Additional Observations

There were no additional observations made during this assessment.

Section 4 : Results Summary

This section contains the following:

FCC Part 15 Subpart C: Test Results

The column headed 'Required' indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

- N No : not applicable / not relevant.
- Y Yes : Mandatory i.e. the apparatus shall conform to these tests.
- N/T Not Tested, mandatory but not assessed. (See section 3.4 Test deleted)

The results contained in this section are representative of the operation of the apparatus as originally submitted.

4.1 FCC Part 15 Subpart C : Test Results

Part 15	Test Description	Required	Result
15.207(a)	Conducted Emission Limits	Y	PASS
15.209	Radiated Emission Limits, General Requirements	Y	PASS
15.215 (c)	Additional provisions to the general radiated emission limitations – 20dB Occupied Bandwidth maintained within the Operating Band	Y	PASS
15.225	Operation within the band 13.110-14.010 MHz	Y	PASS
15.225 (e)	Frequency Tolerance	Y	PASS
15.31 (e)	Supply Voltage Variation	N	N/A

Note: The EUT is powered from an internal battery and therefore supply voltage variation test was not required (not applicable).

Appendix A : Test Results

Clause §15.207(a) Conducted Emissions

Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 mH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBmV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

Test Conditions:

Sample Number:	1	Temperature:	23 °C
Date:	March 30, 2006	Humidity:	36 %
Modification State:	0	Tester:	Roman Kuleba
		Laboratory:	Ottawa

Test Results: See Attached Tables and Plots.

Note:

The EUT was tested with transmission ON and the transmitter set in two different configurations:

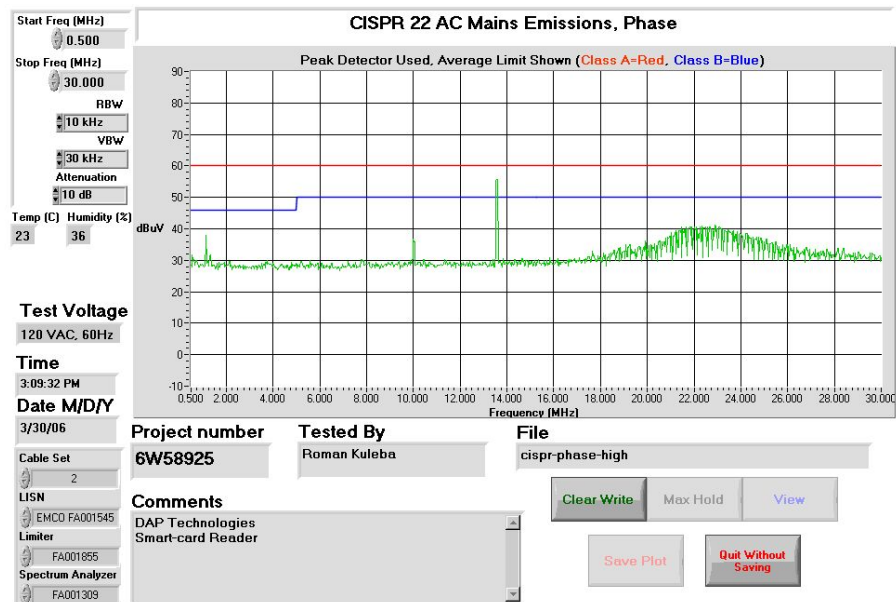
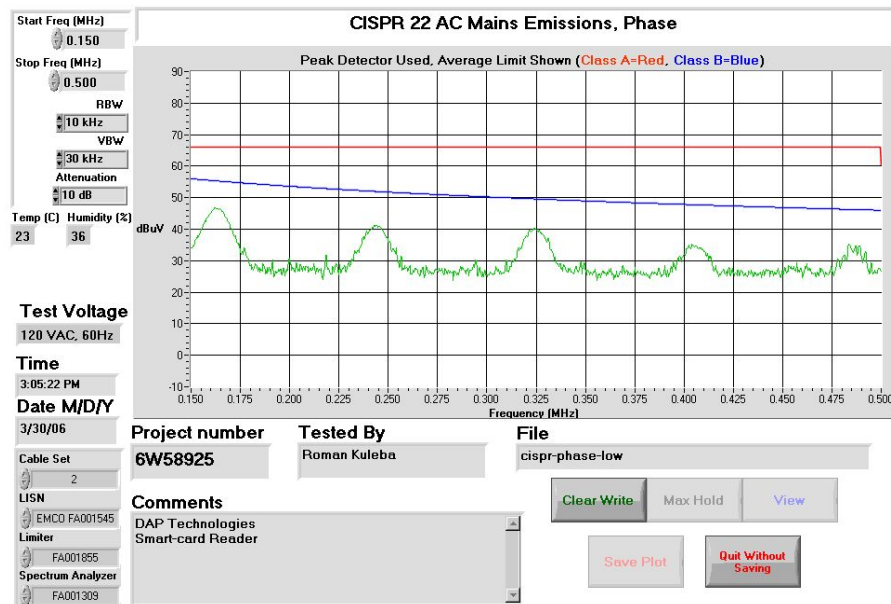
1. Loop antenna connected to the output of the transmitter, and
2. Loop antenna disconnected and replaced with a 50 Ω load at the output of the transmitter.

This was done in order to demonstrate that the emissions exceeding the limits at 13.56 MHz that were measured at the AC-lines on the power-adaptor originated from the radiated signal picked up by the power-adaptor, and not from the emissions conducted from the EUT.

Conducted Emissions, continued

Antenna connected to the output of the transmitter:

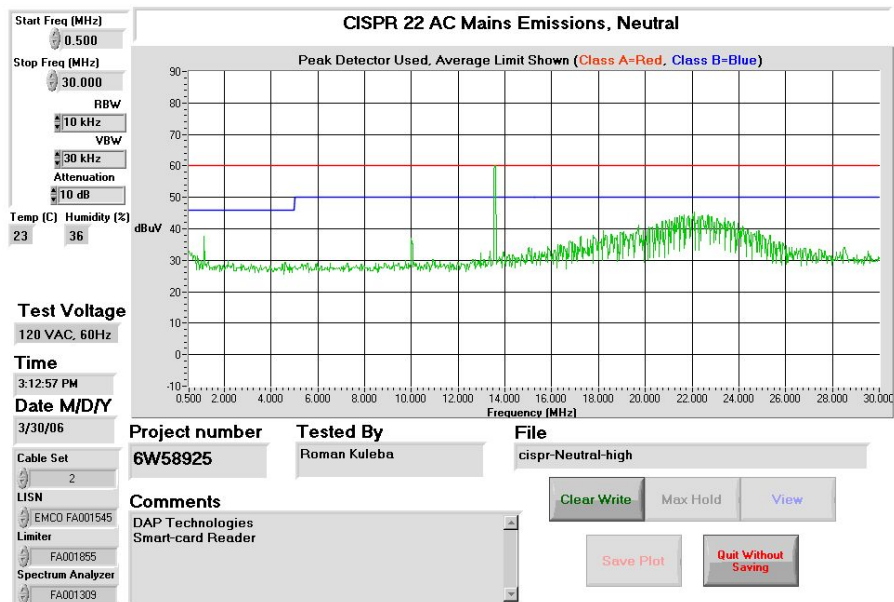
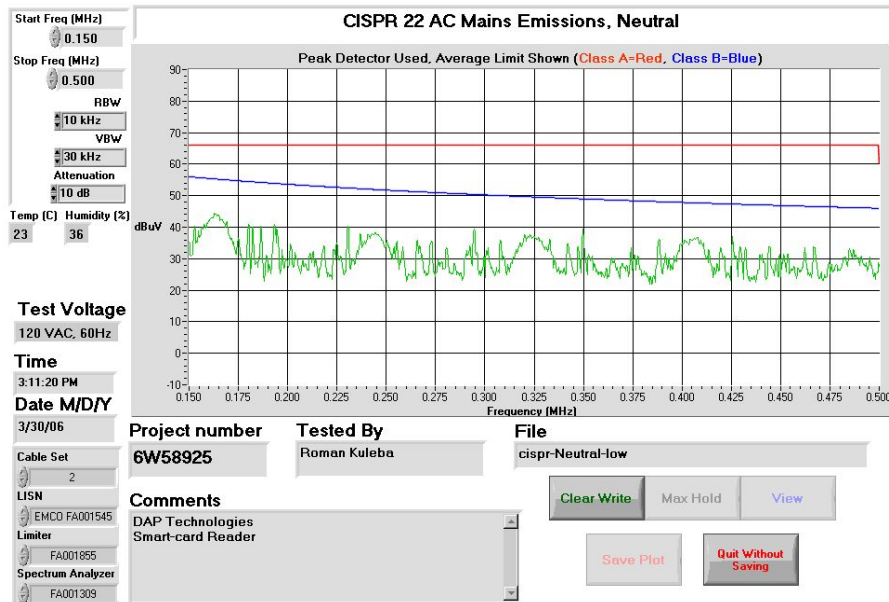
Conducted Disturbance at Mains Plots



Conducted Emissions, continued

Antenna connected to the output of the transmitter:

Conducted Disturbance at Mains Plots, continued



Conducted Emissions, continued

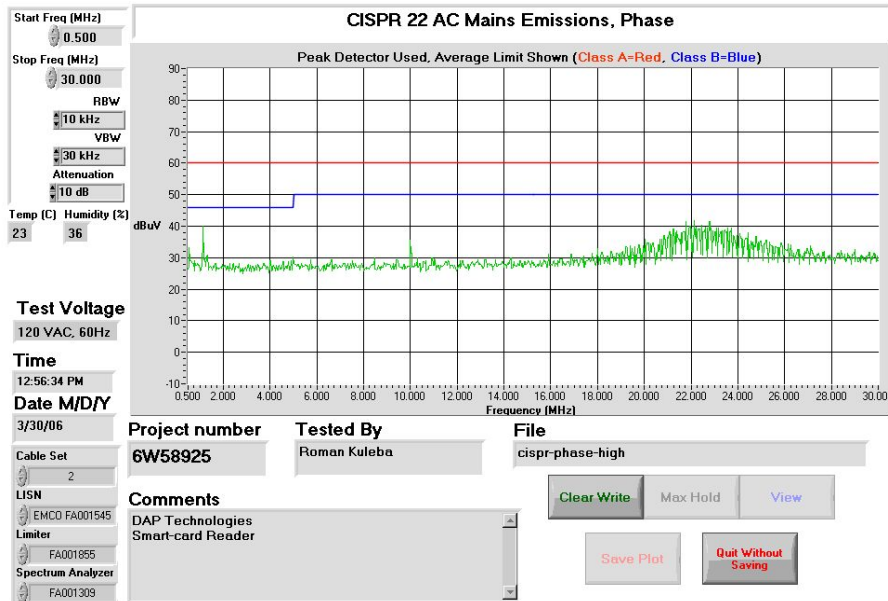
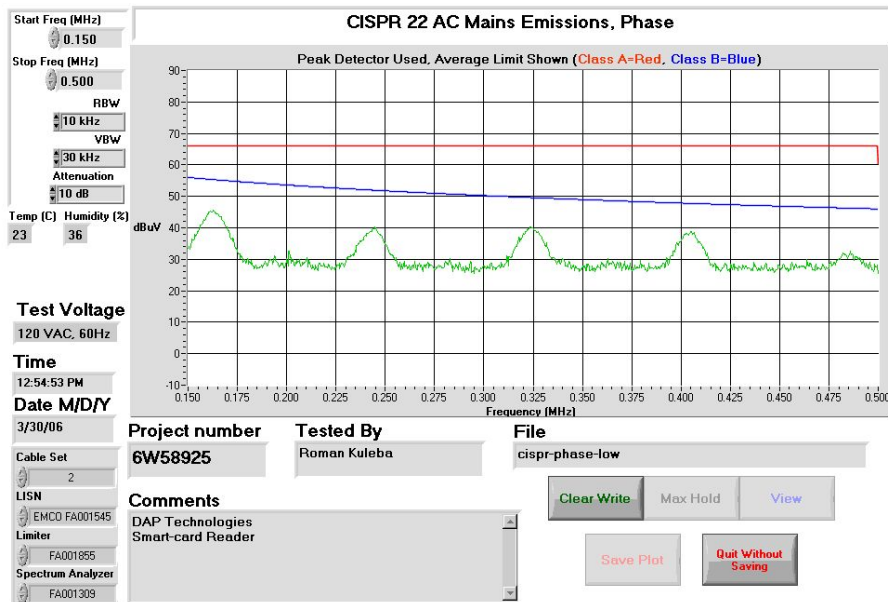
Antenna replaced with a 50Ω load connected to the output of the transmitter:

Test Date: March 30, 2006								
Engineer's Name: Roman Kuleba								
Tested as per: Table Top								
Mains Input Voltage: 120 VAC					Mains Input Frequency: 60 Hz			
Spectrum plots for each frequency band can be found at the back of this section. *All plots were generated with a peak detector and average limits were applied.								
Port Investigation Data								
Port under test: AC Mains								
Results: Refer to plots of this section and tables.								
Conductor	Frequency (MHz)	Detector	Emission Level (dBμV)	LISN Loss (dB)	Cable Loss (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)
Phase	0.1584	Quasi Peak	39.4	0.00	0.11	39.51	65.5	26.0
		Average	28.0	0.00	0.11	28.11	55.5	27.4
	0.3944	Quasi Peak	36.8	0.00	0.20	37.00	58.0	21.0
		Average	28.4	0.00	0.20	28.60	48.0	19.4
	1.1483	Quasi Peak	17.4	0.00	0.19	17.59	56.0	38.4
		Average	14.1	0.00	0.19	14.29	46.0	31.7
	13.5600	Quasi Peak	19.3	0.10	0.40	19.80	60.0	40.2
		Average	14.8	0.10	0.40	15.30	50.0	34.7
	22.4574	Quasi Peak	37.6	0.30	0.40	38.30	60.0	21.7
		Average	27.8	0.30	0.40	28.50	50.0	21.5
Neutral	0.1585	Quasi Peak	40.2	0.00	0.11	40.31	65.5	25.2
		Average	30.0	0.00	0.11	30.11	55.5	25.4
	0.3983	Quasi Peak	36.2	0.00	0.20	36.40	57.9	21.5
		Average	28.7	0.00	0.20	28.90	47.9	19.0
	1.1497	Quasi Peak	17.8	0.00	0.20	18.00	56.0	38.0
		Average	13.8	0.00	0.20	14.00	46.0	32.0
	13.5600	Quasi Peak	25.4	0.10	0.40	25.90	60.0	34.1
		Average	20.0	0.10	0.40	20.50	50.0	29.5
	22.5682	Quasi Peak	35.5	0.30	0.40	36.20	60.0	23.8
		Average	27.1	0.30	0.40	27.80	50.0	22.2
Notes								
Tested with a 50 Ω load at the output of the transmitter.								
Test Result								
Final Test Result: Pass								

Conducted Emissions, continued

Antenna replaced with a 50Ω load connected to the output of the transmitter:

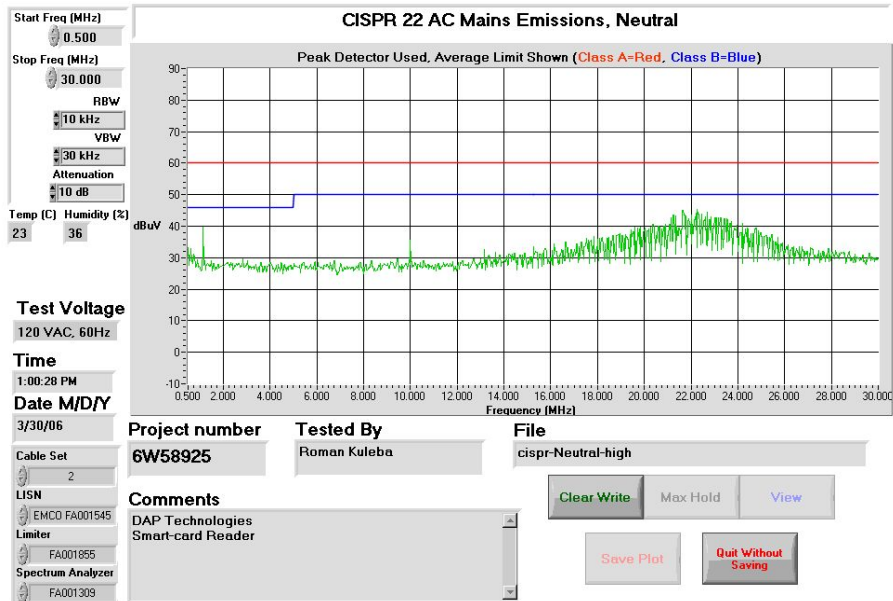
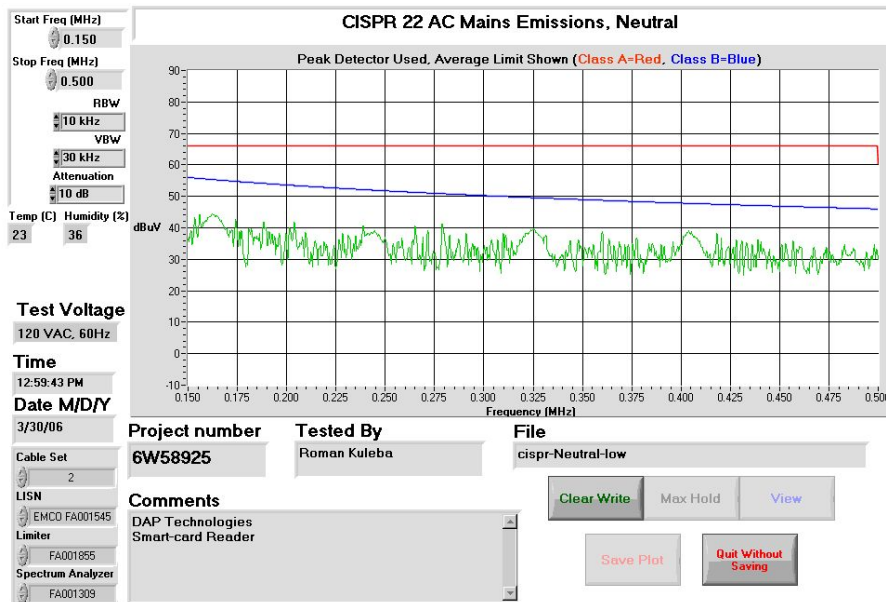
Conducted Disturbance at Mains Plots



Conducted Emissions, continued

Antenna replaced with a 50Ω load connected to the output of the transmitter:

Conducted Disturbance at Mains Plots, continued



Clause §15.209 Radiated Emission Limits, General Requirements

§15.209(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009-0.490	2400/F (kHz)	300
0.490-1.705	24000/F (kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

§15.209(e) The provisions in §15.31, 15.33, and 15.35 for measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

Test Conditions:

Sample Number:	1	Temperature:	23 °C
Date:	March 8 and 16, 2006	Humidity:	36 %
Modification State:	0	Tester:	Roman Kuleba
		Laboratory:	Ottawa

Test Results:

See attached table.

Additional Observations:

The Spectrum was searched from 30 MHz to the 10th harmonic.

The EUT was tested on three orthogonal axes to find the maximum emissions.

Measurement equipment setup was 9 kHz Quasi-peak detector for frequencies below 30 MHz, 120kHz Quasi-peak detector for frequencies between 30 MHz and 1 GHz and 1MHz RBW/VBW Peak detector above 1GHz.

All measurements were performed at 3 meters.

Radiated Emission Limits, General Requirements, continued

Freq. (MHz)	Ant	Pol. V/H	RCVD Signal (dBμV)	Ant. Factor (dB)	Amp. Gain (dB)	Cable Loss (dB)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
72.0118	BC2	V	14.0	8.8	N/A	1.6	24.4	40.0	15.6
109.5000	BC2	V	13.0	11.3	N/A	1.8	26.1	43.5	17.4
176.2738	BC2	V	21.9	13.3	N/A	2.1	37.3	43.5	6.2
264.9500	BC2	V	16.7	17.0	N/A	2.4	36.1	46.0	9.9
298.5851	BC2	V	19.0	17.5	N/A	2.6	39.1	46.0	6.9
497.4430	LP1	V	13.5	17.5	N/A	3.2	34.2	46.0	11.8
203.5100	BC2	H	18.0	14.2	N/A	2.2	34.5	43.5	9.0
298.5851	BC2	H	19.0	18.6	N/A	2.6	40.1	46.0	5.9
442.0373	LP1	H	13.0	16.9	N/A	3.1	33.0	46.0	13.0
497.4400	LP1	H	9.9	17.8	N/A	3.2	30.9	46.0	15.1
Note 1: Antenna Legend: BC = Biconical, BL = Bilog, LP = Log-Periodic, Horn = Horn, ED = EMCO Dipole Note 2: Quasi Peak detector used									

Clause §15.215 (c) Additional provisions to the general radiated emission limitations

§15.215 (c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

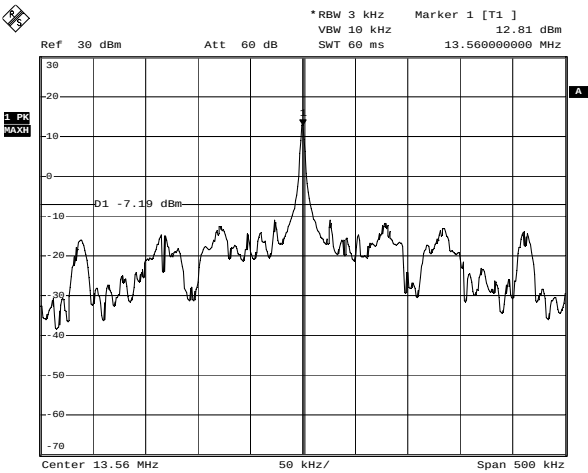
Test Conditions:

Sample Number:	1	Temperature:	23 °C
Date:	March 28 and 16, 2006	Humidity:	36 %
Modification State:	0	Tester:	Roman Kuleba
		Laboratory:	Ottawa

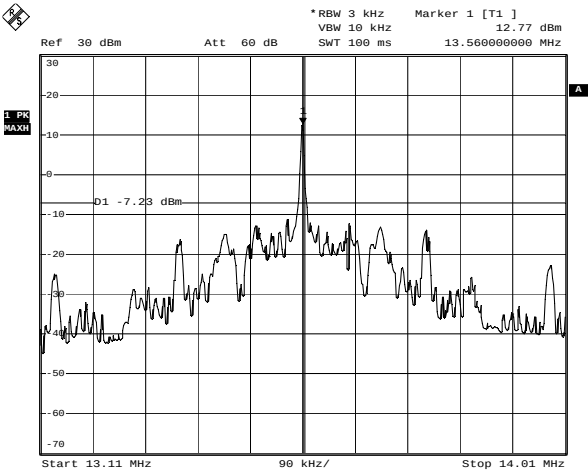
Test Results: See attached plots.

Additional Observations: None.

20dB Occupied Bandwidth to be maintained within the Operating Band (13.110 – 14.010 MHz)



Occupied Bandwidth
Date: 28.MAR.2006 18:02:46



Occupied Bandwidth
Date: 28.MAR.2006 18:47:29

Clause §15.225 (a)(b)(c)(d) Operation within the band 13.110-14.010 MHz, Field Strength of Emissions

§15.225 Operation within the band 13.110-14.010 MHz, Emission Mask:

- (a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
- (b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
- (c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.
- (d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

§15.31(f) (2) At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

Test Conditions:

Sample Number:	1	Temperature:	23 °C
Date:	March 16, 2006	Humidity:	36 %
Modification State:	0	Tester:	Roman Kuleba
		Laboratory:	Ottawa

Test Results:

See attached table.

Additional Observations:

The Spectrum was searched from 30 kHz (the lowest frequency generated) to 30 MHz.

The EUT was tested on three orthogonal axes to find the maximum emissions. Measurement equipment setup was 9 kHz Quasi-peak detector for frequencies below 30 MHz, 120kHz Quasi-peak detector for frequencies between 30 MHz and 1 GHz and 1MHz RBW/VBW Peak detector above 1GHz.

Measurements were performed at 3 meters distance.

The readings were obtained with the testing loop-antenna positioned in three orthogonal axes (x, y and z).

The readings were obtained directly in dBµV/m with transducer factors (antenna factor plus cable loss) pre-programmed in spectrum analyzer.

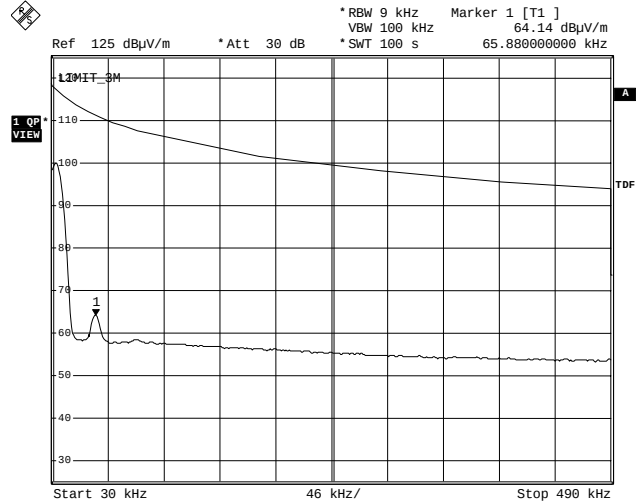
On frequencies below 30 MHz, limits for near-field measurement on 3m distance were determined from 30m distance limits by using the square of an inverse linear distance extrapolation factor (i.e. 40 dB/decade).

Operation within the band 13.110-14.010 MHz, Field Strength of Emissions, continued

Testing loop-antenna orientation: X-axis

Frequency Range: 0.030 – 0.490 MHz

EUT orientation: Back side towards test antenna

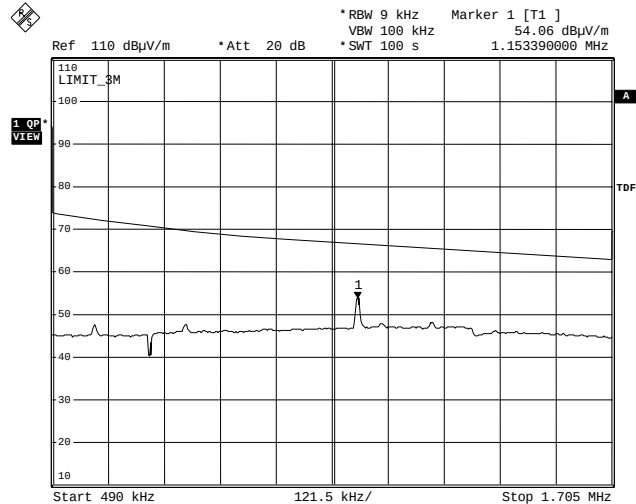


Date: 16.MAR.2006 18:51:09

Testing loop-antenna orientation: X-axis

Frequency Range: 0.490 – 1.705 MHz

EUT orientation: Back side towards test antenna



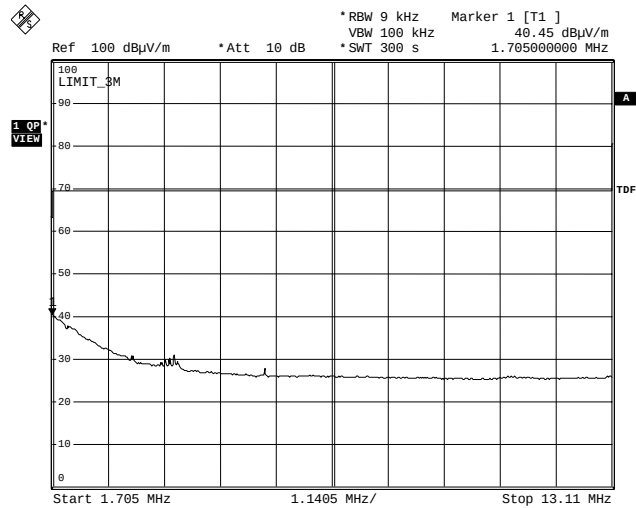
Date: 16.MAR.2006 18:55:40

Operation within the band 13.110-14.010 MHz, Field Strength of Emissions, continued

Testing loop-antenna orientation: X-axis

Frequency Range: 1.705 – 13.110 MHz

EUT orientation: Back side towards test antenna

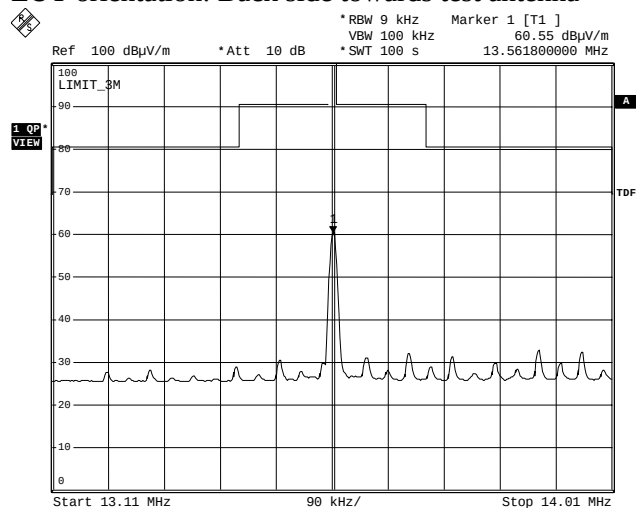


Date: 16.MAR.2006 19:08:17

Testing loop-antenna orientation: X-axis

Frequency Range: 13.110 – 14.010 MHz

EUT orientation: Back side towards test antenna



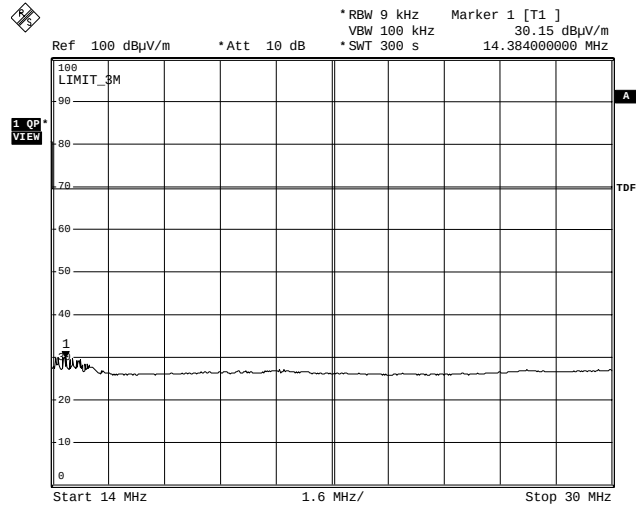
Date: 16.MAR.2006 19:14:24

Operation within the band 13.110-14.010 MHz, Field Strength of Emissions, continued

Testing loop-antenna orientation: X-axis

Frequency Range: 14 – 30 MHz

EUT orientation: Back side towards test antenna

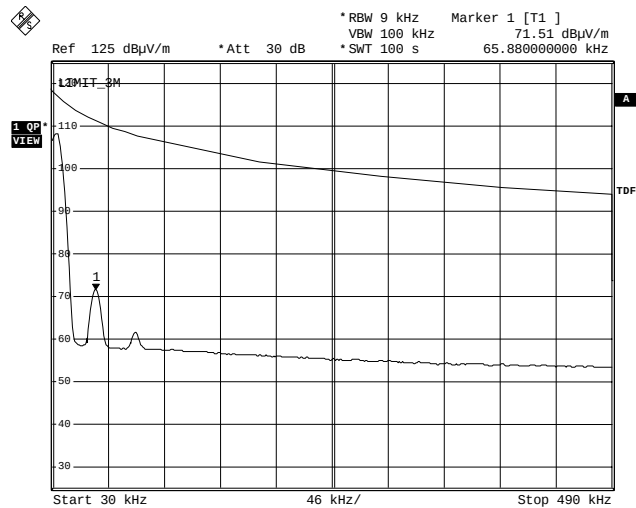


Date: 16.MAR.2006 19:24:07

Testing loop-antenna orientation: Y-axis

Frequency Range: 0.030 – 0.490 MHz

EUT orientation: Left side towards test antenna



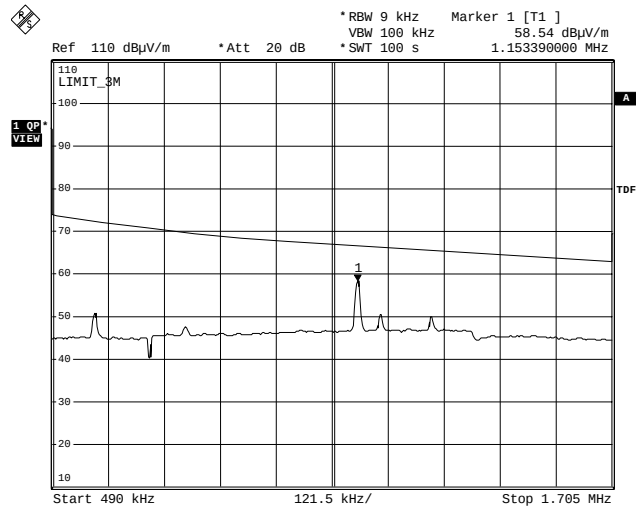
Date: 16.MAR.2006 20:44:16

Operation within the band 13.110-14.010 MHz, Field Strength of Emissions, continued

Testing loop-antenna orientation: Y-axis

Frequency Range: 0.490 – 1.705 MHz

EUT orientation: Left side towards test antenna

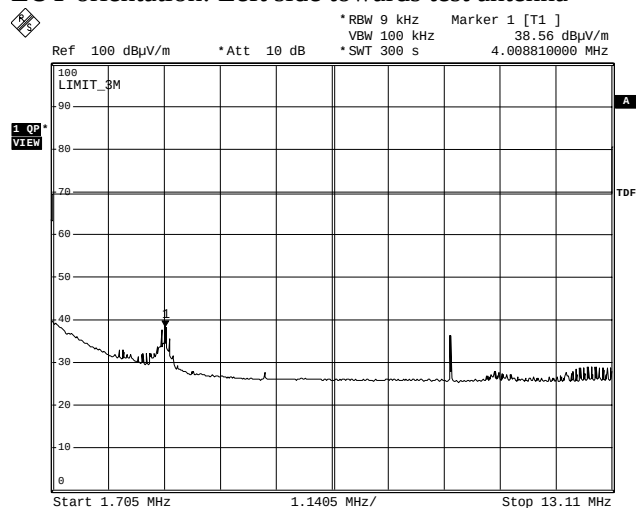


Date: 16.MAR.2006 20:51:08

Testing loop-antenna orientation: Y-axis

Frequency Range: 1.705 – 13.110 MHz

EUT orientation: Left side towards test antenna



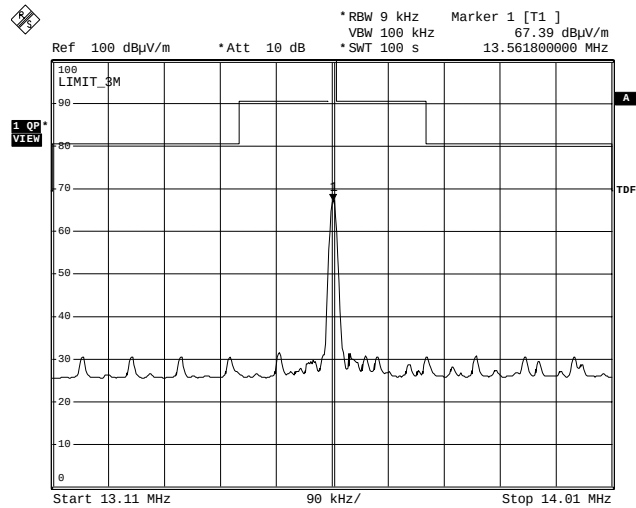
Date: 16.MAR.2006 20:59:34

Operation within the band 13.110-14.010 MHz, Field Strength of Emissions, continued

Testing loop-antenna orientation: Y-axis

Frequency Range: 13.110 – 14.010 MHz

EUT orientation: Left side towards test antenna

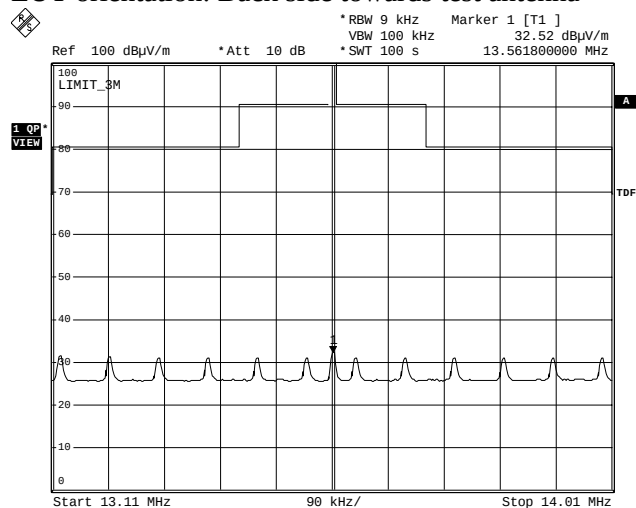


Date: 16.MAR.2006 21:05:46

Testing loop-antenna orientation: Y-axis

Frequency Range: 13.110 – 14.010 MHz

EUT orientation: Back side towards test antenna



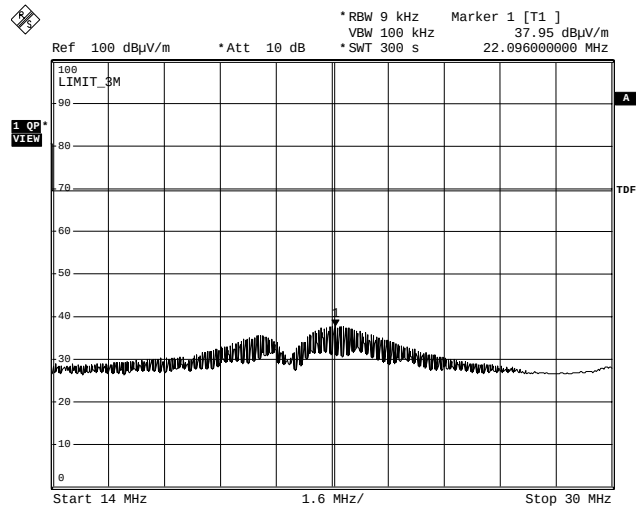
Date: 16.MAR.2006 22:33:03

Operation within the band 13.110-14.010 MHz, Field Strength of Emissions, continued

Testing loop-antenna orientation: Y-axis

Frequency Range: 14 – 30 MHz

EUT orientation: Left side towards test antenna

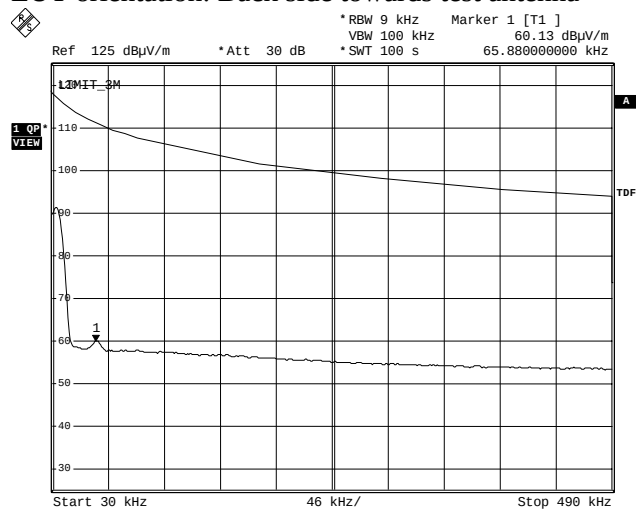


Date: 16.MAR.2006 21:13:27

Testing loop-antenna orientation: Z-axis

Frequency Range: 0.030 – 0.490 MHz

EUT orientation: Back side towards test antenna



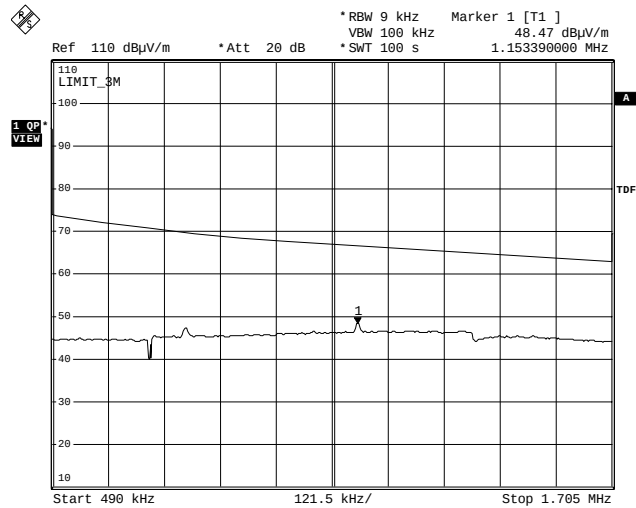
Date: 16.MAR.2006 21:49:40

Operation within the band 13.110-14.010 MHz, Field Strength of Emissions, continued

Testing loop-antenna orientation: Z-axis

Frequency Range: 0.490 – 1.705 MHz

EUT orientation: Back side towards test antenna

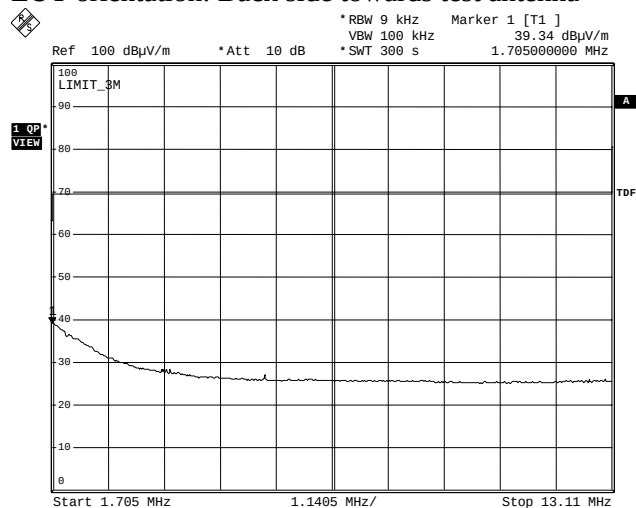


Date: 16.MAR.2006 21:53:52

Testing loop-antenna orientation: Z-axis

Frequency Range: 1.705 – 13.110 MHz

EUT orientation: Back side towards test antenna



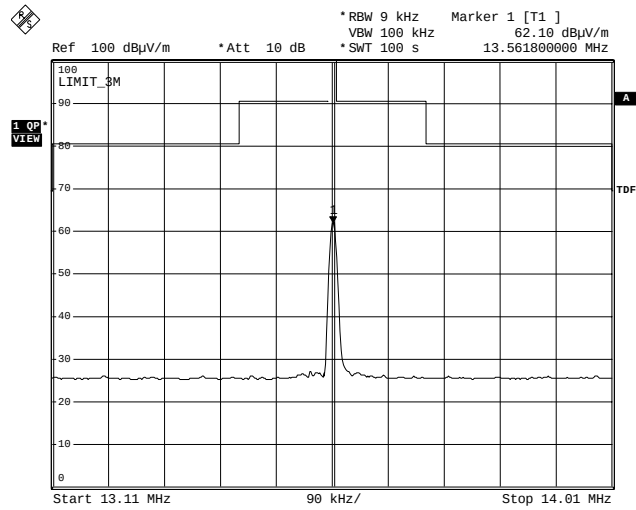
Date: 16.MAR.2006 22:02:43

Operation within the band 13.110-14.010 MHz, Field Strength of Emissions, continued

Testing loop-antenna orientation: Z-axis

Frequency Range: 13.110 – 14.010 MHz

EUT orientation: Back side towards test antenna

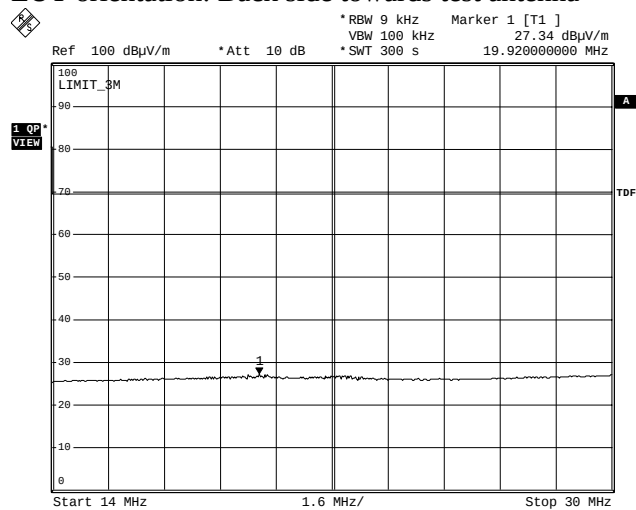


Date: 16.MAR.2006 22:08:03

Testing loop-antenna orientation: Z-axis

Frequency Range: 14 – 30 MHz

EUT orientation: Back side towards test antenna



Date: 16.MAR.2006 22:19:48

Clause §15.225 (e) Operation within the band 13.110-14.010 MHz, Frequency Tolerance§15.225 Operation within the band 13.110-14.010 MHz, Frequency Tolerance:

(e) The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ ($\pm 100\text{ppm}$) of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

Test Conditions:

Sample Number:	1	Temperature:	23 °C
Date:	January 24, 2006	Humidity:	36 %
Modification State:	0	Tester:	Roman Kuleba
		Laboratory:	Ottawa

Test Results:

Pass (See attached table).

Operation within the band 13.110-14.010 MHz, Frequency Tolerance, continued

Limit (Criteria): $\pm 0.01\%$ ($\pm 100\text{ppm}$)

Mains Voltage: 120 VAC

Temperature (°C)	Carrier Frequency (MHz)	Deviation (ppm)
-30	13.559605	3.318692
-20	13.559614	3.982430
-10	13.559611	3.761184
0	13.559596	2.654953
10	13.559575	1.106231
20	13.559560	0.000000
30	13.559554	-0.442492
40	13.559563	0.221246
50	13.559590	2.212461

Note: The EUT is powered from an internal battery and therefore voltage variation test was not required (not applicable).

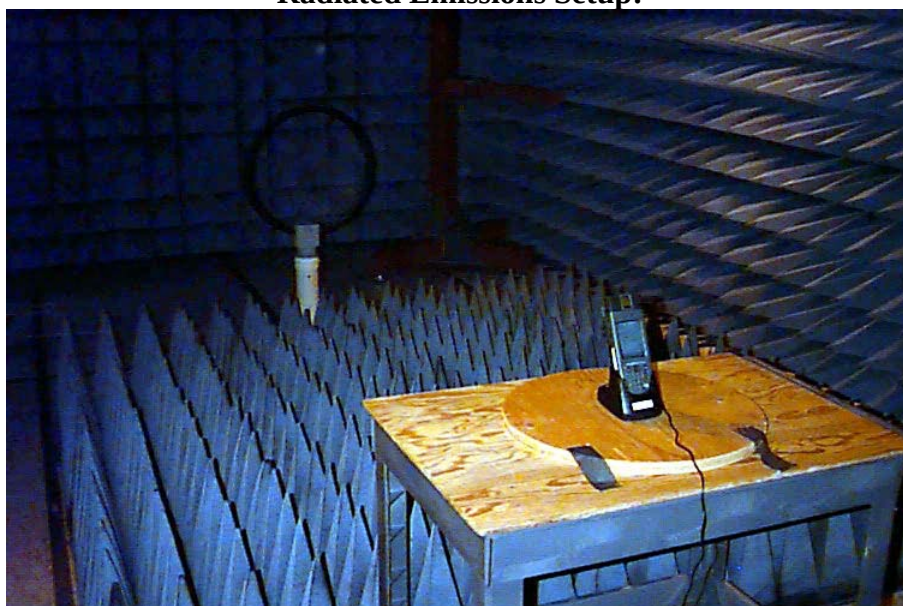
New and fully charged battery was used during the test.

Appendix B : Setup Photographs

Conducted Emissions Setup:

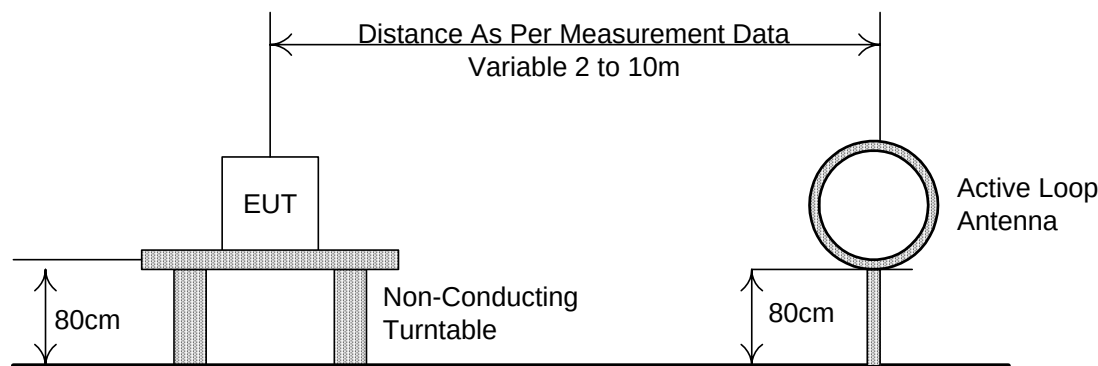


Radiated Emissions Setup:

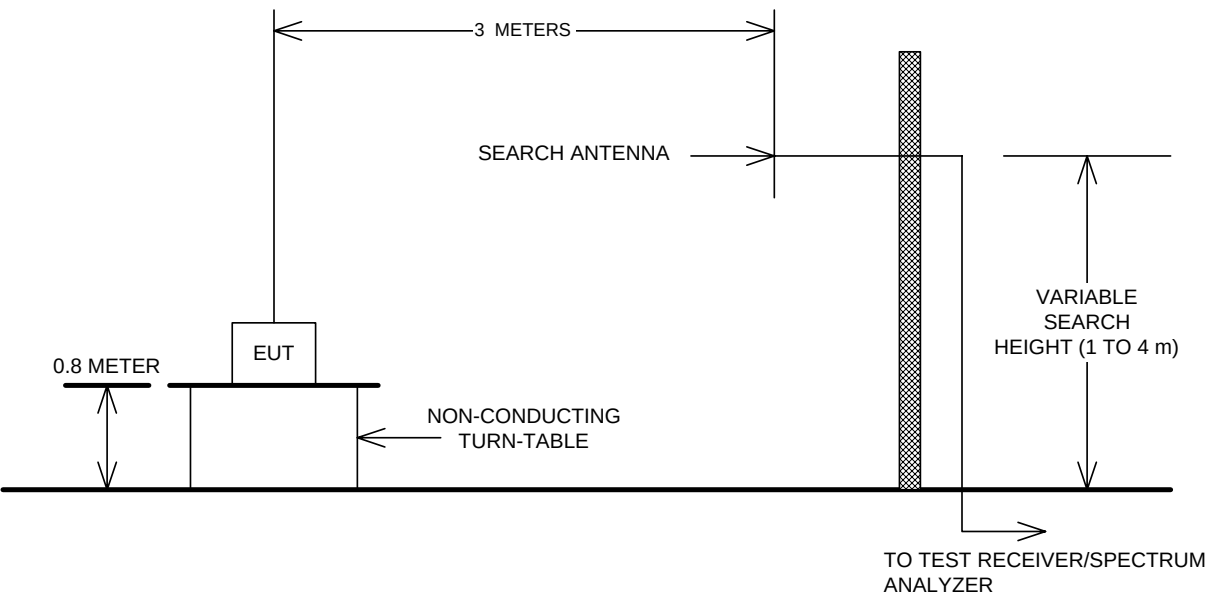


Appendix C : Block Diagram of Test Setups

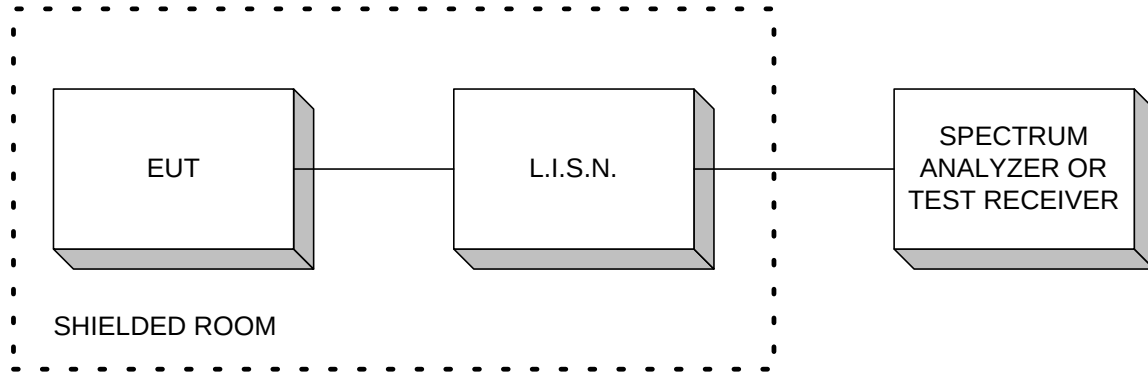
Test Site For Radiated Emissions Below 30MHz



Test Site For Radiated Emissions Above 30MHz



Test Setup for Conducted Emissions



Frequency Stability

